user manual
bio-imaging documentation

ImageMaster VDS-CL

multi-purpose imaging system for biological applications

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Amersham Biosciences

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Preface

About this manual

This manual provides a full reference to the ImageMaster™ VDS-CL bio-imaging system. ImageMaster VDS-CL, together with the ImageMaster analysis software, is a complete package for documentation and analysis of sample images in visible light, fluorescence and chemiluminescence. ImageMaster utilizes software that runs on an integrated PC compatible along with an Intel™ processor under Microsoft™ Windows 95™, and hardware for interfacing the controlling PC to the imaging system.
The manual is organised in 8 chapters and 1 appendix:

Introductory material	1. Introduction 2. Unpacking and installation 3. System overview
System operation	4. Screen functions 5. Touchpad 6. Printer
System management	7. Troubleshooting 8. System Maintenance
Appendix	A. Technical specifications

Assumptions

Two broad assumptions are made in this manual:

1. You should be familiar with the fundamentals of bio-imaging. For background on any particular imaging function, please refer to the appropriate Help Menu, which provides more extensive details.

2. You should be familiar with the general principles of using Microsoft Windows 95 on your PC. Although ImageMaster VDS-CL is a self-contained program package and does not require any direct interaction by the user with Windows 95, the user interface principles follow the conventions set by Windows 95 programs.

Typographical conventions

Menu commands, the names of dialogue boxes and windows, the contents of dialogue boxes and windows, and option buttons are written with a **bold helvetica** typeface. Menu commands are written in the order of the menu name and then the command, separated by a colon. For example:

"Select **File:Save Image** to display the **Save Image** dialogue. Locate the destination drive and folder and enter a file name. Click on **Save**."

This directs you to click on the **File** menu and select the command **Save Image**. A dialogue called **Save Image** is displayed in which you must locate the destination folder for the saved file, give the file a name, and choose the image format. You then click on the button called **Save** in the dialogue to execute the save command.

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1 Introduction

The ImageMaster VDS-CL is a multifunction bio-imaging station designed for quick and accurate photo-documentation of electrophoretic and Chemiluminescent results. The system includes:

- a 312-nm ultraviolet (UV) transilluminator sample tray for documentation of ethidium bromide-stained agarose and polyacrylamide gels, as well as excitation of fluorophorescent samples.

- a Chemiluminescent tray for documentation of chemiluminescence samples.

- a white light sample tray and various filters for documentation of polyacrylamide gels, Coomassie blue, silver-stained gels, membranes, films, blots, thin-layer chromatography (TLC) plates, autoradiographs and more.

The tray area is 21 x 25 cm, with a maximum image transmission size of 17.5 x 21 cm. This accommodates the developed area of one full size Multiphor™ gel, 8 mini-gels, or up to 15 PhastGel™ gels.

The imaging system comprises a highly sensitive, charged coupled device (CCD) camera connected to a monitor, which allows for image viewing and manipulation of camera controls before the image is printed or saved. A Pentium™ computer controls the system and the interface is based on Windows 95. The camera, lens, lights, filters and all other functions are controlled automatically. This imaging system is contained in a free-standing "dark-room" that includes UV and white light sources for obtaining images in transmitted or reflected light conditions. Once the image is optimised, it can be printed on the integrated thermal printer. Two grades of film are available: the higher grade Super VDS film is thermally activated and fixed, and the regular VDS film is thermally activated and UV-light fixed. Both use a polymer emulsion technology that produces a sharp image on tough plastic and both have a storage life of 2 years (under proper storage conditions: temperature of 10 to 23 C and relative humidity of 45% +/- 15%). In addition, the information can be stored on a floppy disk, on the integrated hard-disk, or to a connected network. The system can be directly connected to a 10baseT or 100baseT Network through the network connector on the back panel.

2 Unpacking & Installation

The ImageMaster VDS-CL should be handled carefully during the unpacking procedure, and care should be taken when installing and connecting the system. Please follow the directions outlined below.

2.1 Unpacking Procedure

Unwrap all packages carefully and compare the contents with the packing list, making sure all items arrived. Inspect all components for damage that may have occurred while the unit was in transit. If any part appears damaged, immediately contact the carrier.

Be sure to keep all packing material for re-packing, should it become necessary to move the unit.

Use the following steps to unpack the ImageMaster VDS-CL.

1. Gently remove the box lid and the upper cardboard/foam material.

2. Take out all items from the upper foam and put them in a safe place. Remove the upper foam damper.

3. Take out the monitor box.

4. Take out the film holders (a pair of green holders near the monitor box).

5. Remove the film roll from the foam near its holders.

6. Remove the keyboard box and any additional cardboard/foam material.

7. Remove the surrounding cardboard sleeve.

Caution: Lifting the ImageMaster VDS-CL from the shipping box requires at least 2 persons. Maintain the instrument in an upright, balanced position - follow the directions below with particular care.

8. Placing one hand on the groove on the lower side of each end (see Fig 2.1), and another hand on the upper back side of the system, carefully lift the instrument out of the lower foam and place it on a clean surface in a ventilated room. Be careful not to tip the instrument while moving it - rather keep it upright or tilted slightly back with the weight against your upper hand.

Fig 2-1. Proper positioning of hands when moving the system.

9. If necessary, correct the level of the system by adjusting the extension of the feet.

10. Remove the two foam holders from the internal UV drawer before use.

2.2 Packing List

While unpacking, verify that each of the following components was delivered:

2.2.1 System Components

1. VDS-CL system

2. LCD Monitor, AC adaptor for the monitor, VGA cable, AC adaptor power cord

3. Keyboard
4. Power cable
5. Thermal film
6. Film holders (2 pcs.)
7. Drawers: WL, UV, CL
8. 3m, twisted network cable.
9. Field calibrator

2.2.2 Documents

1. Microsoft license

2.2.3 Manuals

1. User manual
2. Monitor manual
3. Printer manual

2.3 Installation

2.3.1 Precautions

Before installing the system, make sure that the following points are considered carefully.

- Under normal operation of the VDS-CL system, the user is not exposed to UV light. All UV lamps automatically turn off when any door is opened or when the sample tray is pulled out.
- Exposure to UV light is harmful. If you choose to operate the UV Cutting option (360nm), put the UV drawer in the cutting position and be sure to wear UV-blocking glasses to shield your eyes.
- Due to the danger of exposure to high voltage, the rear panels should only be removed by trained service technicians.
- The AC power outlet must be properly grounded to protect both personnel and the equipment.
- All devices must be turned off before connecting to any other device (such as a computer). Making connections with devices turned on may damage both devices.

- Shut down the system properly according to Windows 95 procedures. Disconnecting the system prematurely may result in damaged system files.
- Store film in a cool place away from sunlight.
- Do not leave objects on the top cover as it may interfere with proper ventilation.
- Do not look directly at the laser source, and avoid positioning your head directly within sight of the laser while the door is open.
- Locate instrument at a minimum distance of 30cm from the wall and ceiling.
- The ideal operating conditions for the instrument are 25 C (78 F) and 55% relative humidity (recommended).
- Do not replace UV and WL lamps while the instrument is connected to the mains power outlet.
- There is a lithium battery in the computer motherboard. This battery is not replaceable by the customer.
- Use only an S.B 4amp fuse - there is one spare fuse in fuse housing.
- Please be absolutely certain that you are using the correct mains voltage (100 - 240 VAC ±10%, 50/60 Hz).

2.3.2 Installation procedures

During system installation, follow the steps in order as given below.

1. Remove the monitor from its box and place it on its base on the upper right side of the system.
2. Attach the monitor power supply connection cables to the monitor power inlet and the system's power outlet.
3. Plug the monitor VGA cable into the monitor socket.
4. Place the keyboard on the extendable keyboard holder (underneath the instrument base plate) and plug the keyboard cable into the keyboard socket.
5. If the system will be connected to a network, plug the network cable into the network connector.

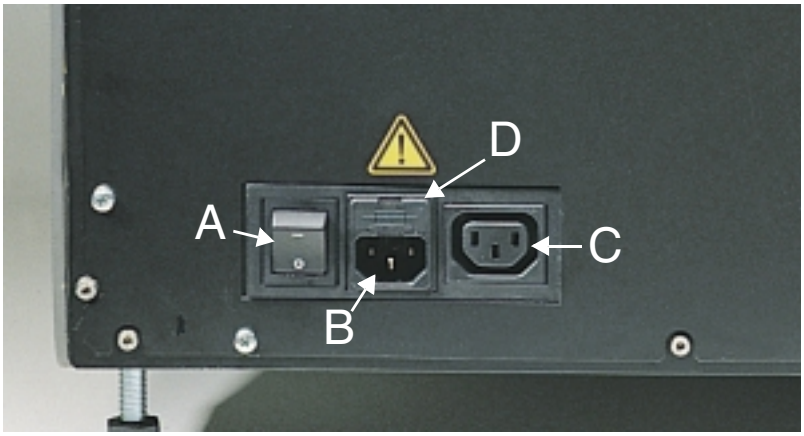

Fig 2-2. Layout of the power panel, with On/Off switch (A), power inlet (B), power outlet (C), and the fuse holder (D) with spare fuse.

6. Attach the power cable to the mains outlet.

7. Insert the film into the printer as outlined in Chapter 6.

The system is now operational.

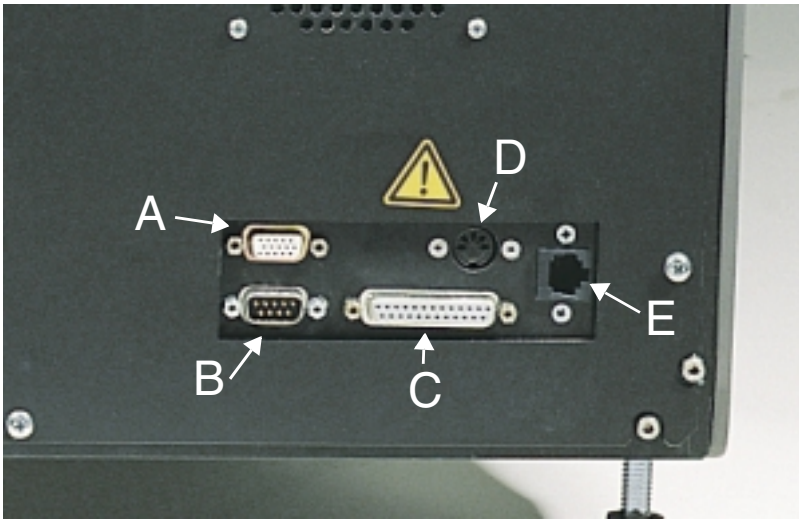

Fig 2-3. Layout of the computer panel showing port connections for the monitor (A), serial cable (B), parallel (C), keyboard (D) and network (E).

3 System overview

The ImageMaster VDS-CL software was designed for advanced imaging functionality within a user-friendly environment. This chapter provides a brief overview of the system layout and functions.

3.1 The Screen Interface

All system functions are controlled from the screen. Details of the system functions can be found in the following chapters. Users should be familiar with the Windows 95 interface and functions. Two aspects of the screen interface, the Toolbar and the Status bar, are described in more detail below.

3.2 Toolbar

The toolbar is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in the ImageMaster VDS-CL.

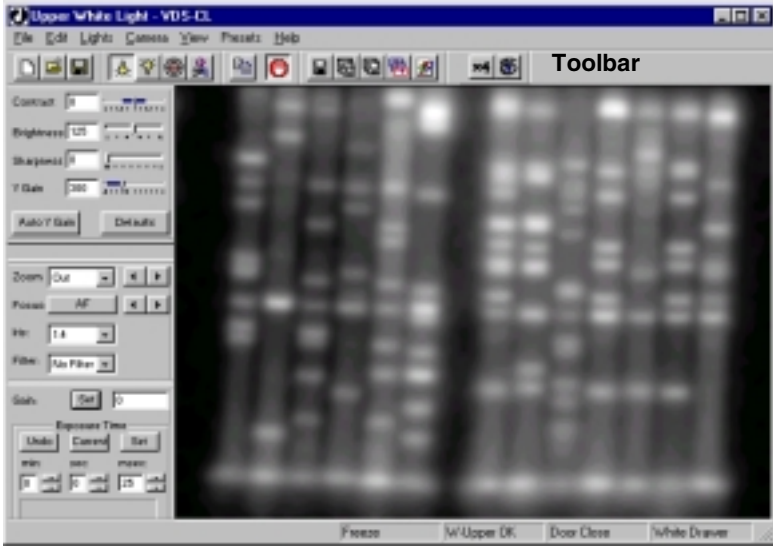

Fig 3-1. The screen Interface with Toolbar and Status bar

To hide or display the Toolbar, choose Toolbar from the View menu (ALT, V, T). The following items are available on the toolbar:

Function	Toolbar Icon	Keyboard shortcut
Default State		<Ctrl + N>
Load Procedure...		<Ctrl + O>
Save Current Procedure as...		
Upper Light On/Off		
Lower Light On/Off		
Guide Light On/Off		
Cut Light On/Off		
Copy		<Ctrl + C>
Freeze		
Lap Time Save...		
Incremental Save...		
Save Image...		
Illumination correction...		
Save image as Bitmap...		
Interpolate...		
Image Viewer		

3.3 Status Bar

The status bar is displayed at the bottom of the onscreen window. To display or hide the status bar, use the Status Bar command in the View menu.

The left area of the status bar describes actions of menu items as you use the arrow buttons to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicates which of the following functions are activated:

Live, Freeze, Saving Image - indicates the current system video situation.

Lights - indicates the light and light sensors state. In case one of the lamps is burned and the matched light is operated, the system will state error, the light type and the number of the burned lamp.

Doors - indicates if door is open or closes. The system will operate lights only if the door is closed.

Drawer - Indicates the drawer type and position.

3.4 Camera Control Bar

The Image Master VDS-CL contains the following Dialogue Bars:

Digital Dialogue Bar
Optics Dialogue Bar
Analog Dialogue Bar

The Dialogue Bars are located on the left portion of the screen and provides a quick access to most of the functions listed under **Camera** drop-down menu. As the functions of the Digital, Analog and Optics Dialogue bars are dealt with in detail in Chapter 4, the user is referred to that chapter for a detailed description of the functions.

Fig 3-2. The Camera Control Dialogue Bar.

3.5 Getting Started

These directions are designed as a quick introduction to the initial steps involved in acquiring an image. After setting up the system and turning it on (see Chapter 2), follow the steps below:

1. Check to make sure the system is not in Freeze state (the left panel in the status bar should read "Live").

2. Move into Default state using the **Default** toolbar icon.

3. Unfreeze the image using the **Freeze** toolbar icon.

4. Open the door and pull the current drawer out to the edge. The drawer must be lifted gently at the end and fixed into position. The right-most pane in the Status bar should read "Guide".

5. Place your sample in the middle of the drawer. For the positioning of the sample, use the **Guide light** toolbar icon.

6. Insert the drawer in the chamber, but do not close the chamber door.

7. Increase the **Gain** value in the Analog Dialogue bar to 200 and press **Set** to set it.

8. Unfreeze the image using the **Freeze** toolbar icon.

9. Set the camera **Zoom** in the Optics Dialogue bar to fit the size of the sample-the less irrelevant space in the image, the better the resolution.

10. Close the door and focus the camera by pressing the **AF** button in the Optics Dialogue bar.

11. From this point, you can select the right preset that matches your application from the **Presets** drop-down menu or continue through step 12

12. Choose the appropriate filter for your application (the CL application uses No Filter)

13. Set the **Gain** value in the Analog Dialogue bar to the appropriate value or 0.

14. Unfreeze the image using the **Freeze** toolbar icon.

15. Choose the right illumination for your application (for CL, No illumination is used).

From this point, you set the optimal conditions depending on which application you choose:

CL Applications	FL Applications
1. Set the **Iris** value to 1.2 using the Iris combo box in the Optics Dialogue bar.	1. If there is too much light, increase the Iris value and then, if necessary, increase/decrease the **Exposure Time** through the Analog Dialogue bar.
2. Set the **Gain** value to 180 and press **Set** to set it.	2. If there is not enough light, increase the **Exposure Time** through the Analog Dialogue bar and then if necessary, increase the **Gain** value.
3. Set the **Exposure TIme** through the Analog Dialogue bar to match the application notes.	
4. If the resulting image is unsatisfactory, either try **Auto Y Gain**, **Contrast** or **Brightness** from the Digital Dialogue bar or change **Exposure Time** and **Gain** parameters to obtain a new image.	

3.6 On-line Help Menu

This manual is designed as an introduction to the layout and functioning of the ImageMaster VDS-CL system. More detailed instructions on the following functions can be directly accessed via the online Help Menu:

- Menus

- Dialogue Boxes

- Dialogue Bars

- Toolbar

- Status Bar

3.7 Other system functions

3.7.1 Lights

The user can operate upper or lower white lights only when the white light tray is inserted and the door is closed. Upper and lower UV lights can only be operated when the UV drawer is in and the door is closed.

3.7.2 Cutting option

The UV drawer can be used to cut the sample on it. To perform the cutting operation, the UV drawer is inserted and pulled towards the user until the right panel in the status bar reads "Cut & Guide". The **Cut Light** icon on the screen is then depressed, triggering a 360 nm light from the lower lamp field. This function is performed with the door open, but the user MUST use visual protection.

3.7.3 Positioning of samples

When the drawer is inserted, but the door still open, the user can use the **Guide Light** icon on the screen to produce a laser spot. The laser is directed to the center of the drawer and facilitates proper positioning of the blot.

3.7.4 Camera

The user can control all of the important camera parameters including focus, iris, zoom, shutter or exposure time and gain.

3.7.5 Save options

The system allows the user to save files in a variety of formats including 8, 10, 12, 16 bit images in TIFF formats. In addition, the **Incremental Save** and **Lap Time Save** functions allow the user to save and view images in different time increments, thus allowing for the optimisation of image quality.

3.7.6 Filters

The user can control a filter wheel automatically and , depending on the desired result, choose various filter colours. For Chemiluminescent work, use the CL filter, which means No Filter is employed.

4 Screen functions

Most of the system functions for the ImageMaster VDS-CL system are available within one of the drop-down menus. This summary will lead you through the following onscreen menus:

- File

- Edit

- Lights

- Camera

- View

- Presets

- Help

4.1 File Menu

Fig 4-1. The File drop-down menu.

The **File** menu is used to organize and save the results of your analysis and documentation. The drop down menu consists of the following options:

4.1.1 Default State

Set the system to the initial position of all parameters.
When turning the ImageMaster VDS-CL system on (not through user defined procedure) it will automatically be set to default state.
After manipulating the settings of an image, the user can return to the default state by selecting **File:Default State,** or by selecting the Default State

Shortcut <CTRL+N>

The default position of each parameter is:

Sharpness = 0
Gain = 0
Contrast = 0
Iris = 1.2
Filter = No Filter
Exposure Time = 20 msec
Zoom = Out
Procedure Name = Default
Brightness = 125
Y-Gain = 256
User Defined Text To Add To Image = None

4.1.2 Save Image

Use this command to save the active image. When you save an image, ImageMaster VDS-CL displays the **Save As** dialogue box for you to name your image.
Images can be saved in TIFF (*.tif) formats in 8, 10, or 12 bit resolution and can be also stretched to 16 bits by default.
The following options allow you to specify the name and location of the file you're about to save:

- File Name

Type a new filename to save a document with a different name. The system supports long file names (using Windows 95 standards) and an extension of up to three characters. ImageMaster VDS-CL adds the extension you specify in the **Save File As Type** box.

- Drives

Select the drive in which you want to store the document.

- Directories

Select the directory in which you want to store the document.

- Network...

Choose this button to connect to a network location, assigning it a new drive letter.

4.1.3 Incremental Save

Use this command to save images with incremented exposure times. Select **File:Incremental** Save or click on the Incremental Save toolbar icon, and then choose among the following options:

Starting Exposure Time: - The Starting Exposure Time can be altered by either inputting the desired values directly in the windows, or by clicking on the sliders to the right of each window

End Exposure Time: - The End Exposure Time can be altered by either inputting the desired values directly in the windows, or by clicking on the sliders to the right of each window

Multiply Factor: - Use this Combo Box to choose a multiply factor i.e. incremental increase, for the Exposure Times. The user can set the Start and End Exposure Times, and then adjust the Multiply Factor to arrive at the proper number of images or iterations.

Use this Combo Box to choose a multiply factor for the Exposure Time.

Start From End Exposure Time: - Use this Check Box to start taking your images from the end of the Exposure Time to the beginning

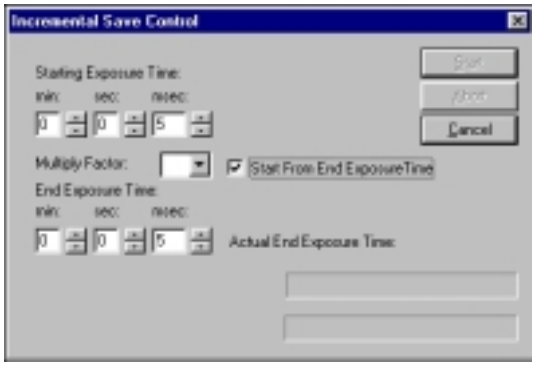

Fig 4-2. The Incremental Save Dialogue Box.

Start - Once the desired parameter values have been set, use this button to start the Incremental Save process. The system will then display **Save As** dialogue box asking for a File name, Directory and image file format.

Abort - Use this button to stop the incremental save process.

Cancel - Use this button to leave the Incremental Save dialogue box.

4.1.4 Time Lapse Save

This command is used for time lapse imaging. Select **File:Time Lapse Image Save** or click on the Time Lapse toolbar icon, and then choose among the following options:

Exposure Time: - Exposure Time can be chosen either by directly inputting values in the windows, or by using the sliders buttons to the right of each window.

Number of iterations - Use this function to choose how many images will be taken.

Delay - Use the edit box and buttons to choose the time delay between images.

Note: The minimum time resolution is 1 second.

Averaged Sum: - Use this check box to average a series of images into one image in each iteration.

Sum Images: - Use this check box to sum your images into one image in each iteration.

Start - When all parameters have been set, push this button. The system will then display a **Save As** dialogue box allowing the user to assign a file name, image format, and directory location.

Abort - use this button to Abort the Time Lapse Save operation.

Cancel - use this button to return to the main menu.

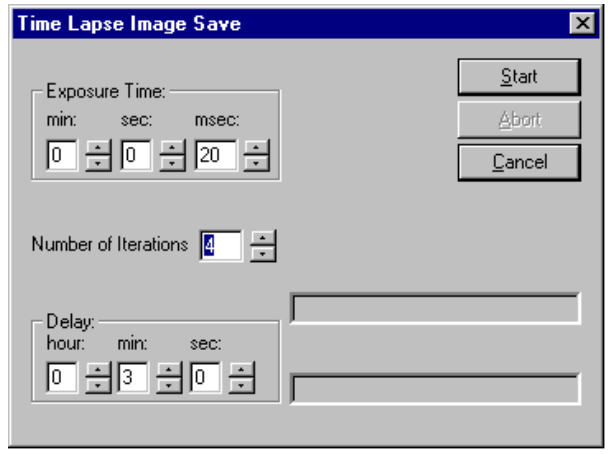

Fig 4-3. The Time Lapse Image Save dialogue

Note: When using either **Incremental Save** or **Time lapse Image Save**, two figures in consecutive order will be added to the given file name for each image (e.g. filenamexx.tif).

4.1.5 Illumination Correction

Illumination correction is used to correct light source aberrations within saved images. A second image is generated from the original, according to the user defined criteria in the dialogue box. The new image is given the same name, but with an "_FFC" suffix. To initiate illumination correction, select **File:Illumination Correction** or click on the Illumination Correction toolbar icon, and then use the following buttons:

Acquire Image - Use this button to choose the name and format of the images you wish to save.

Flat Field - Use this button to acquire the reference image for the flat field calculation.

Cancel - Use this button to return to the main menu.

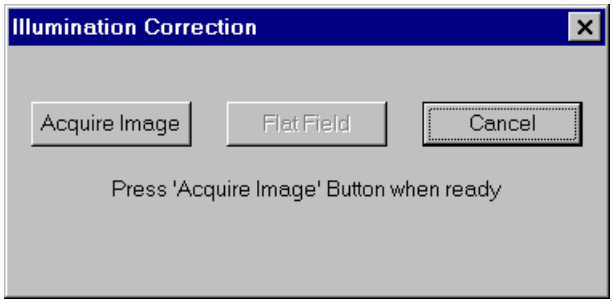

Fig 4-4. The Illumination Correction dialogue.

Note: When using the white light (WL) drawer, the user will be asked to remove the image media and close the door before the **FlatField** button will be enabled. When using the UV drawer, replace the image media with the "Field Calibrator" before the second exposure.

4.1.6 Save Current Frame as Bitmab

Use this command to save the active frame. When you save a bitmap, ImageMaster VDS-CL displays the **Save AS** dialog box for you to name your bitmap.

4.1.7 Image Viewer

Use this command to view saved images.
To initiate the Image Viewer, select **File:ImageViewe**r or click on the Image Viewer toolbar icon. ImageMaster VDS-CL system displays the Image Viewer dialog box for the user to choose one of the following:

- Adding an image to the Image Viewer.
- Creating a procedure form the viewed image.
- Print the viewed image in the video printer or a regular printer.
- Change the values of the black and white range.
- Zoom the viewed image.

In this way the user has the ability to view saved images, print the images and create new procedures using the saved images parameters.

Add Image - use this button to add an image to the Image Viewer. The selected image will be added to the image's list in upper part of the Dialog Box.

Create Procedure - use this button to create a procedure from the parameters that are listed in the right side of the Dialog Box.

Remove Image - use this button to delete the selected image in the viewer.

Print - use this button to print the image in a regular printer (e.g. ink, laser, etc…) connected to the system through the parallel port.

Video Printer - use this button to print the image in the system's video printer.

Fit to window - use this button to fit the image to the viewer's window size.

Set Values - use this button to set the maximum and minimum values of the slider as shown in the matching Edit Boxes.

Invert - use this check box to invert the image.

Zoom - use this check box to change the pointer from a zooming mode to a shifting mode and back.

Images List: use this list to change the image in the view window.

View Window: use this window to view the image, zoom in and out and shift the image in the window.

Parameters List: use this list to view the image parameters. Those are the parameters that will be used in the created procedure.

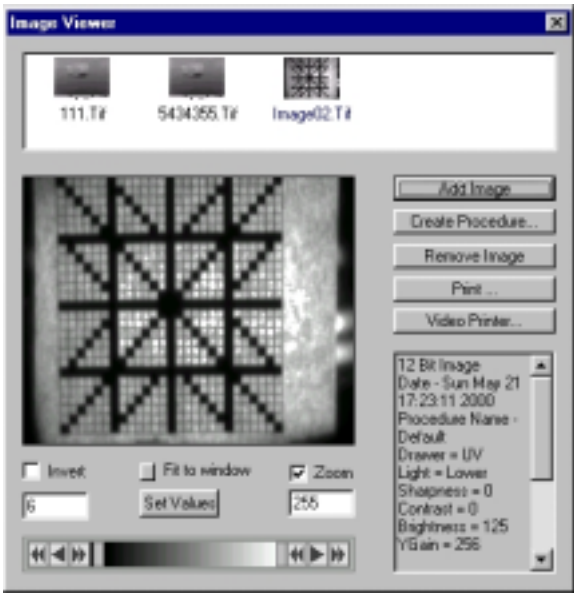

Fig 4-5. The Image Viewer window

4.1.8 Export to Photoshop standard

Select **File:Export to Photoshop standard** to export an ImageMaster TIFF file to meet Photoshop 16 bit grayscale file format by changing a tag on the image. This is useless if the files are stretched to 16 bits by default. In both cases, the format is compatible with ImageQuant™.. The new file will be stored in the same directory and is given a "_PS" suffix.

Note: It is not possible to change files not created by the ImageMaster VDS-CL.

4.1.9 Interpolate

Use this command to increase the resolution of an image you selected by four (twice in the width and twice in the height). When you interpolate an image, ImageMaster VDS-CL display the **Open File** dialog box for you to choose the file. After interpolation completion, it saves the image with a suffix of _IT to the image name.
Before using this tool, we recommend to use the noise filtering feature as described in Chapter **4.8**. This will remove unwanted single pixel noise from the image and enhance the results.

4.1.10 Optional Text to Saved Images

Select **File:Optional Text to Saved Images** to add text to the bottom of the image in the saved file. The text is added without altering the original file information.

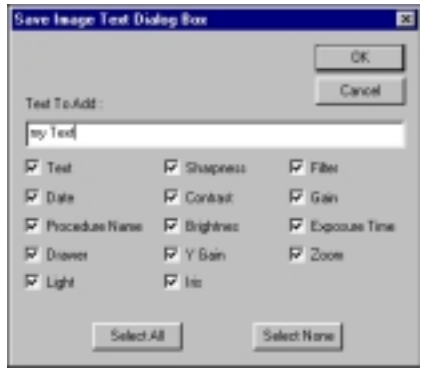

Fig 4-6. The Text to Add dialogue box

4.1.11 Exit

Choose **File :Exit** to end your ImageMaster VDS-CL session without shutting down the system.

Mouse: Double-click the application's Control menu button (on the upper right corner).

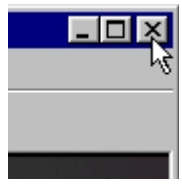

Fig 4-7. The window Exit button

Keyboard: <ALT+F4>

4.1.12 System Shut Down

The **System Shut Down** dialogue is displaed when the user chooses **File:System Shut Down**. The system will always prompt the user to save any opened, but unsaved documents. Choose the **Yes** button to shut down the system, or the **No** button to return to the previous window.

Note: It is important to wait for the "It is now safe to turn off your computer" prompt before turning off the mains power to your system. Turning off the power before this dialogue appears may damage system files.

4.2 Edit Menu

The Edit menu contains the **Copy** command. Select **Edit:Copy** or click on the Copy toolbar icon to copy the current image onto the clipboard. Copying an image to the clipboard erases any data that were previously stored there..

Keyboard: <CTRL+C>

4.3 Lights Menu

Fig 4-8. The Lights drop-down menu.

4.3.1 Lights Off

Select **Lights:Lights Off** to turn off all lights in the system housing. When selected, the **Lights Off** option displays a check mark next to the menu text. In addition, the lamps box in the Status bar should read "Sensors OK".

4.3.2 Upper Light On/Off

Selecting **Lights:Upper** or clicking on the Upper Light toolbar icon turns the Upper lighting source on or off. When another light is on and the user chooses to turn the Upper light on, the current light is switched off. There are 3 onscreen indicators visible when the Upper light is turned on:

1. A check mark is visible next to the **Upper** menu text.
2. The Upper Light icon on the toolbar is depressed.
3. The Lamps box in the status bar indicates “W-Upper OK” if the White drawer is used, or “U-Upper OK” if the UV drawer is used.

4.3.3 Lower Light On/Off

Selecting **Lights:Lower** or clicking on the Lower Light toolbar icon turns the Lower lighting source on or off. When another light is on and the user chooses to turn the Lower light on, the current light is switched off. There are 3 onscreen indicators visible when the Lower light is turned on:

1. A check mark is visible next to the **Lower** menu text.
2. The Lower Light icon on the toolbar is depressed.
3. The Lamps box in the status bar indicates “W-Lower OK” if the White drawer is used, or “U-Lower OK” if the UV drawer is used.

4.3.4 Guide Light On/Off

Selecting **Lights:Guide** or clicking on the Guide Light toolbar icon turns the laser pointer on or off. This laser pointer is only available when the drawer is positioned above the Cut light and the Drawer panel in the status bar reads "Guide". There are 3 onscreen indicators visible when the Guide light is turned on:

1. A check mark is visible next to the **Guide** menu text.
2. The Guide Light icon on the toolbar is depressed.
3. The Lamps box in the status bar indicates "Guide OK".

4.3.5 Cut Light On/Off

Selecting **Lights:Cut** or clicking on the Cut Light toolbar icon turns the Cut light on or off. This cut light is only available when the drawer is positioned above the Cut lamps and the Drawer panel in the status bar reads "Cut & Guide". There are 3 onscreen indicators visible when the Cut light is turned on:

4. A check mark is visible next to the **Cut** menu text.

5. The Cut Light icon on the toolbar is depressed.

6. The Lamps box in the status bar indicates "Cut OK".

4.4 Camera Menu

The Camera menu contains the following commands:

- Freeze

- Block the system on the first exposure time

- Default Digital Parameters

- Contrast

- Brightness

- Sharpness

- Y Gain

- Zoom

- Auto Focus

- Iris

- Filter

- Gain

- Exposure Time

- Date and Time Display

- Display Text

Note: With the exceptions of **Freeze, Block the system on the first exposure time, Default Digital Parameters, Date and Time Display** and **Display Text,** all of the camera functions can also be accessed directly in the camera function box on the left side of the main screen.

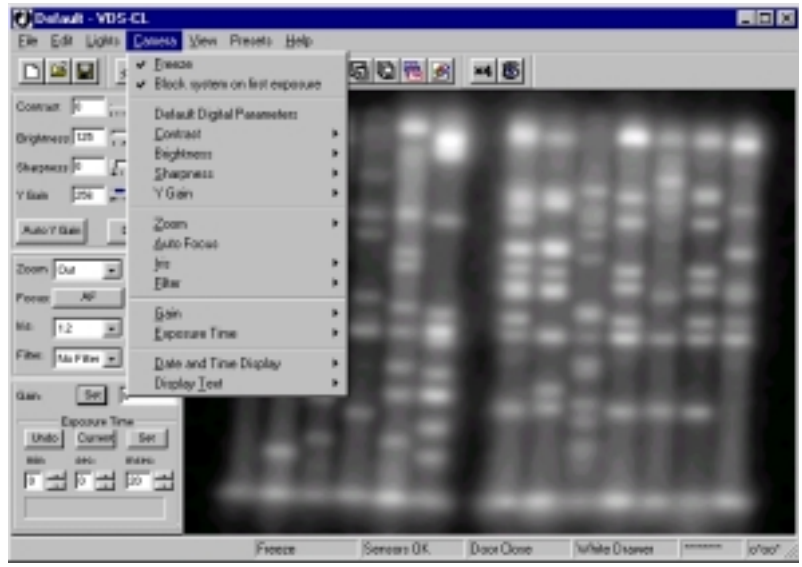

Fig 4-9. The Camera drop-down menu.

4.4.1 Freeze

The **Freeze** command can be accessed either by selecting **Camera:Freeze,** or by clicking on the **Freeze** toolbar icon. When any of the following functions are used, the system automatically employs the **Freeze** command:

- Setting the Exposure Time.

- Setting the Gain.

- Setting a new Procedure.

- Setting a new Preset.

- Activating Default State.

There are 2 onscreen indicators alerting the user that the **Freeze** function is on:

1. A check mark appears next to the **Freeze** menu item in the **Camera** menu.

2. The **Freeze** icon on the Toolbar is pushed in.

4.4.2 Block System on First Exposure

Use this command to block the system on every time a new exposure time is set.
When Block is on, ImageMaster VDS-CL system will display Blocking Dialog box allowing the user to cancel the blocking.

4.4.3 Default Digital Parameters

Use this command to reset all digital parameters to their default values i.e. : Contrast = 0, Brightness = 125, Sharpness = 0 and Y-Gain = 256.

4.4.4 Contrast

The following **Contrast** Values are available from the Menu **Camera:Contrast: -1023, -512, -256, -125, 0, 125, 256, 512, 1023.**

This setting will only affect the displayed or printed image. You can adjust the **Contrast** slider into the Digital dialogue bar on the left part of the screen.

4.4.5 Brightness

The following **Brightness** Values are available from the Menu **Camera:Brightness: 0, 50, 100, 125, 150, 200, 255** (which is the maximum Brightness value available).This setting will only affect the displayed or printed image. You can adjust the **Brightness** slider into the Digital dialogue bar on the left part of the screen.

4.4.6 Sharpness

The following **Sharpness** Values are available from the Menu **Camera:Sharpness: 0, 10, 20, 30, 40, 50, 60, 67** (which is the maximum sharpness value available). This setting will only affect the displayed or printed image. You can adjust the **Sharpness** slider into the Digital dialogue bar on the left part of the screen.

4.4.7 Y Gain

The following **Y Gain** Values are available from the Menu **Camera:Y Gain: 10, 20, 40, 100, 200, 256, 400, 800** (which is the maximum Y Gain value available).
Another option is Auto Y Gain (Camera->Y Gain->Auto Y Gain), the system will decrease the Y Gain automatically to meet the optimum brightness.

This setting will only affect the displayed or printed image. You can adjust the **Y Gain** slider into the Digital dialogue bar on the left part of the screen or push the **Auto Y Gain** button.

4.4.8 Zoom

This function allows the user to quickly zoom in or out in graded steps, from wide angle ("Out") to the tightest zoom ("In"). The following Zoom Values are available from the Menu **Camera:Zoom: Out, 2, 3, 4, 5, In.**

You can adjust the **Zoom** into the Optics dialogue bar on the left part of the screen.

4.4.9 Auto Focus

Use this command to automatically focus the camera. Activating Auto Focus initiates several other functions while the focus is set, including turning the Upper White Light On. However, once the auto focus has been achieved, the system will return to the previous settings.

Adjust the **Focus** through the **Camera:Auto Focus** drop-down menu or with the onscreen **Focus** buttons:

4.4.10 Iris

The following Iris Values are available from the Menu **Camera:Iris: 1.2, 1.4, 2, 2.8, 4, 5.6, 8 and 11** or from the onscreen **Iris** combo box:

4.4.11 Filter

The following Filter options can be chosen either with the **Camera:Filter** drop-down menu, or with the onscreen **Filter** combo box:

- UV Low - Band Pass 520 nm, FWHM: 50 nm.

- UV High - Band Pass 580 nm, FWHM: 50 nm

- Green - High Pass 490 nm

- Blue - Low Pass 450 nm

- Red - Low Pass 590 nm.

4.4.12 Gain

The following Gain Values are available from the Menu **Camera:Gain: 0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250**. or by choosing a value and then pressing **Set** on the onscreen Gain controls:

4.4.13 Exposure Time

This commands allows the user to choose among available exposure times, ranging from 20 msec to 20 minutes. Adjust these values either with the **Camera:Exposure Time** drop-down menu, or with the onscreen **Exposure Time** setting controls:

4.4.14 Date and Time Display

This menu allows the user to enable or disable the camera's Date and Time Displays

4.4.15 Display Text

Use this command to display and remove text from the camera image memory. The user may choose between:

On - Choosing On prompts the Display Text dialogue box, allowing the user to insert text. The text is then displayed on the screen and is available on the printout from the thermal printer.

Off - Removes the Text from the camera image memory.

4.5 View Menu

The View menu allows the user to toggle various screen views on and off, thereby optimising the workspace on the screen. The View menu contains the following commands:

- Toolbar

- Status bar

- Analog Dialog Bar

- Digital Dialog Bar

- Optics Dialog Bar

- Default View

Fig 4-10. The View drop-down menu.

4.5.1 Toolbar

Use this command to display or hide the Toolbar. A check mark appears next to the **Toolbar** menu item when the Toolbar is displayed.

4.5.2 Status Bar

Use this command to display or hide the Status Bar at the lower right hand corner of the screen. A check mark appears next to the menu item when the **Status Bar** is displayed.

4.5.3 Analog Dialog Bar

Use this command to display or hide the Analog Dialog Bar at the left of the screen. A check mark appears next to the menu item when the **Analog Dialog Bar** is displayed. The Analog Dialog Bar allows to set the Gain value and the Exposure Time.

4.5.4 Digital Dialog Bar

Use this command to display or hide the Digital Dialog Bar at the left of the screen. A check mark appears next to the menu item when the Digital Dialog Bar is displayed. The **Digital Dialog Bar** is used to control the look of the image on screen and on a printer by changing the Contrast, Brightness, Y Gain and Sharpness.

4.5.5 Optics Dialog Bar

Use this command to display or hide the Optics Dialog Bar at the left of the screen. A check mark appears next to the menu item when the Optics Dialog Bar is displayed. The **Optics Dialog Bar** is used to control the camera optics. User can set the focus, Iris, Filter and Zoom from this dialogue box.

4.5.6 Default View

Use this command to set the system to default view status.

4.6 Presets Menu

The **Presets** menu contains the following commands:

- User Defined: Load Procedure...

- User Defined: Save Current Procedure As...

- System Presets

Fig 4-11. The Presets drop-down menu.

4.6.1 Load Procedure

Use this command to load existing Procedure. The ImageMaster VDS-CL system will change the current system parameters to the loaded parameters. When loading a Procedure, the system displays the **File Open** dialogue box prompting you to choose the stored Procedure to load. Note that you cannot reload the same procedure name that the one already in memory.

4.6.2 Save Current Procedure As

Use this command to save and name the active setting. The system displays the **Save As** dialogue box, allowing the user to name the procedure and choose a destination directory for saving. To save the current, updated procedure with its existing name and directory, use the **Save** command

4.6.3 System Presets

Use one of the presented system Presets as a first approach to optimise the chosen kit.

Name	Bright-ness	Con-trast	Drawer	ExpTime	Filter	Gain	Iris	Light	Shrp -ness	Y gain	Zoom
CDP-Star large size blots	125	0	ECL	10:00:00	No Filter	250	1.2	None	0	50	Out
CDP-Star medium size blots	125	0	ECL	5:00:00	No Filter	220	1.2	None	0	50	3
CDP-Star small size blots	125	0	ECL	5:00:00	No Filter	200	1.2	None	0	50	5
ECL large size blots	125	0	ECL	5:00:00	No Filter	250	1.2	None	0	50	Out
ECL medium size blots	125	0	ECL	5:00:00	No Filter	220	1.2	None	0	50	3
ECL small size blots	125	0	ECL	4:00:00	No Filter	200	1.2	None	0	50	5
ECL Plus Western large size blots	125	0	ECL	2:00:00	No Filter	180	1.2	None	0	130	Out
ECL Plus Western medium size blots	125	20	ECL	1:00:00	No Filter	180	1.2	None	0	130	3
ECL Plus Western small size blots	125	20	ECL	1:00:00	No Filter	180	1.2	None	0	130	5
ECF Western large size blots	125	0	UV	0:30:00	UV High	0	4	Upper	0	250	out
ECF Western medium size blots	125	0	UV	0:30:00	UV High	0	4	Upper	0	250	3
ECF Western small size blots	125	0	UV	0:30:00	UV High	0	4	Upper	0	250	5
AlkPhos Direct ECF large size blot	100	-50	UV	0:30:00	UV High	180	4	Upper	0	450	out
AlkPhos Direct ECF medium size blot	100	-50	UV	0:30:00	UV High	180	4	Upper	0	450	3
AlkPhos Direct ECF small size blot	100	-50	UV	0:30:00	UV High	180	4	Upper	0	450	5
Sypro Ruby gels 20 x 18 cm	125	0	UV	0:01:00	UV High	150	1.2	Lower	0	250	out
Sypro Ruby gels 10 x 8 cm	125	0	UV	0:01:00	UV High	150	1.2	Lower	0	250	3
EtBr Large gels	100	0	UV	0:05:00	UV High	150	4	Lower	0	250	out
EtBr small gels	100	0	UV	0:05:00	UV High	150	4	Lower	0	250	4

Name	Bright-ness	Con-trast	Drawer	ExpTime	Filter	Gain	Iris	Light	Shrp -ness	Y gain	Zoom
Coomassie Gels 20 x 18 cm	100	-50	White	0:00:080	No Filter	0	4	Lower	0	250	out
Coomassie Gels 10 x 8 cm	100	-50	White	0:00:080	No Filter	0	4	Lower	0	250	3
Silver stained gels 20 x 18 cm	100	-50	White	0:00:080	No Filter	0	4	Lower	0	250	out
Silver stained gels 10 x 8 cm	100	-50	White	0:00:120	No Filter	0	4	Lower	0	250	3

4.7 Help menu

The **Help** menu contains the following commands:

- Help Topics

- About IM VDS-CL

Fig 4-12. The Help drop-down menu.

4.7.1 Help Topics

Use this command to view the system's Help menu topics.

4.7.2 About IM VDS-CL

Use this command to display the copyright notice and version number of your copy of ImageMaster VDS-CL.

Fig 4-13. The About IM VDS-CL dialogue box.

4.8 Spot Filtering Tool

There is a tool provided from version 2.01 of the software that allows the noise filtering on images.

On the VDS-CL desktop, there is an icon called SP Filter.

By clicking on this icon, a **File Open** dialogue box pops up. Choose the file you will to clean up and press Enter key. A new file will be created into the same directory with a similar name and a suffix _SF.

This application is only removing single high intensity pixels from the image and improves the quality for further quantitation or for eventual publication if combined with Interpolation.

It is recommended to use this feature before using the Interpolate feature in Chapter **4.1.9.**

5 Touchpad

The ImageMaster VDS-CL utilizes a Touch Pad interface that allows the user to navigate the on-screen menu system. You can access the Touch Pad control panel by clicking on the Windows Start button (lower left hand corner of screen) and then choosing **Settings: Mouse**.

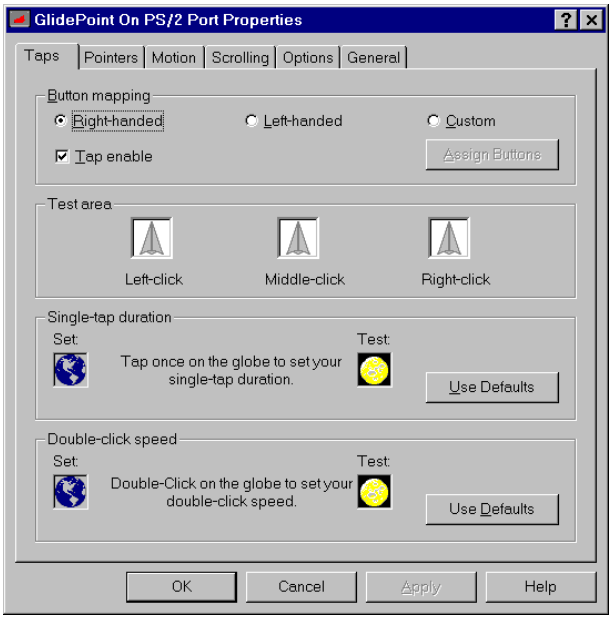

Fig 5-1. The Touch Pad control panel.

5.1 The Taps panel

To configure the taps functions, click on the **Taps** panel.

These options allow you to adjust functions related to the touchpad's buttons and touchpad tapping features. These options can also be used to configure other detected pointing devices.

5.1.1 Learning to tap on the touchpad

Click, double-click, drag and highlight functions of the left-click and right-click mouse buttons can be activated by tapping directly on the surface of the pad. Remember, the touchpad responds best to a light, quick tap.

To "click", lightly and quickly tap the surface of the pad once.

To "double-click", rapidly tap on the pad twice.

To "drag", draw, or highlight, double-tap and hold your finger down on the second tap. Then glide your finger to move.

To "drag" further than the touchpad surface, simply lift your finger and reposition after reaching the textured edge of the pad.

5.1.2 Pointers Tab

If the touchpad control panel is open, click on the **Pointer** tab now.

This group of options allows you to change the pointer's appearance. This section is identical to the Microsoft Pointer options.

To change all of the pointers at once, select a different scheme.

To change the appearance of a specific pointer, click on the pointer to be changed and select **Browse** to locate other pointer styles.

5.1.3 Assign Buttons (on the right hand side of the touch pad)

This option becomes available when the **Custom** option has been selected.

When you click on **Assign Buttons**, you will be asked what button or tap you would like to assign. You can choose any of the available buttons and can also use the **Ctrl** key on your keyboard plus any of the touchpad buttons or tapping features.

Once you have selected a button or tap, you will be asked to select a function to attach to the selected button or tap.

Follow the steps below to make an assignment:

Make sure the touchpad control panel is open.

1) Click the **Taps** tab and click **Custom**.

2) Click **Assign Buttons**.

3) Press a touchpad button of your choosing.

4) Select a function (for example, select "**double-click**").

5) Click **Finish**.

6) Click **Apply** to store your settings.

The button that you selected should now function as a double click button.

To test it out, place your cursor on an application icon and press the button you selected as "double-click".

5.1.4 Test Area

The test area is designed to quickly display your current button configuration.

By putting your cursor in the **Test Area** portion of the touchpad control panel and pressing the touchpad's buttons (or taps), you will get an indication of your current button configuration.

Below are the standard mouse button functions and what they do in Windows 95:

Left-click (Primary)- is used to open applications, drag and select items.

Right-click (Secondary)- is used for extended menu functions and special drag operations.

Middle-click (Auxiliary)- is currently an application specific function.

5.1.5 Single-Tap Duration

This option allows you to set the single-tap duration of the touchpad.

Personalize your single-tap speed and duration by tapping once on the **Earth** icon (the **Earth** icon should spin). You can verify your setting in the test area (the **Moon** icon).

Click on the **Use Defaults** button to set your single-tap duration back to its original setting.

5.1.6 Double-Click Speed

This option allows you to set the double-click speed of the current pointing device.

This setting affects the touchpad buttons as well as the touchpad tapping features.

Personalize your double-click speed by double clicking or double-tapping on the **Earth** icon. You can verify your setting in the test area (the **Moon** icon). If you would like to set your double-click or double-tap speed back to it's original setting, click on the **Use Defaults** button.

5.2 Motion Tab

If the touchpad control panel is open, click on the **Motion** tab now. The options that are available in **Motion** allow you to adjust the pointing device's motion characteristics and pointer trails.

5.2.1 Pointer Trails

Pointer trails provide visual feedback by leaving a distinctive cursor trail. This may help if you have difficulty locating the cursor on your screen.

You may adjust the length of the trails from short to long.

The **Show pointer trails** check box is used to enable or disable the pointer trails option.

5.2.2 Relative Speed

This adjustment allows you to increase the motion sensitivity of the pointing device. The higher the speed setting, the faster the cursor moves as you glide your finger across the touchpad. This setting is helpful for fine tuning the pointing device's range of motion and responsiveness.

5.2.3 Acceleration

This adjustment allows you to change the pointing device's acceleration. Acceleration allows the cursor to move faster on the screen with increased movement from the pointing device. Acceleration increases in increments depending on how the adjustment is set. Acceleration allows quick cursor movement while maintaining cursor accuracy with small amounts of movement.

Setting acceleration to **none** disables the acceleration feature.

5.3 Scrolling Tab

If the touchpad control panel is open, click on the **Scrolling** tab now.

These options control the available methods of scrolling.

The touchpad activated scrolling is compatible with many Windows applications including '97 applications that support advanced scrolling and zooming.

Scrolling also incorporates audible feedback that may be applied to each of the scrolling options and types.

5.3.1 Scrolling Method

These settings allow you to choose the scrolling method to use.

None disables the touchpad scrolling options.

5.3.2 Scrolling Types

This group of options allows you to enable or disable specific scrolling functions.

You can enable or disable the following:

- **Vertical**

- **Horizontal**

- **Zoom**

- **Back/forward**

5.3.3 How do I use Scrolling?

Scrolling enables you to quickly access the scroll bars in most Windows applications, Zoom in many '97 applications and move Back and Forward in many applications such as web browsers.

The touchpad surface displays vertical and horizontal arrows that designate the areas in which the touchpad activates the scroll commands.

If the cursor is in a window that has a scroll bar, scroll functions can be activated.

5.4 Options Tab

If the touchpad control panel is open, click on the **Options** tab now.

This group of settings allows you to adjust various touchpad features.

5.4.1 Autojumps

Autojumps are designed to help you save time by automatically moving the cursor to predefined locations when applications or dialogue windows are opened.

The following autojumps are available:

No Autojumps

Default Button - The autojump features setting causes the cursor to jump to the default button (such as the **OK** button) in the newly opened window or dialogue box

System menu box - This setting causes the cursor to jump to the system menu box (the small icon in the top left corner) of a newly opened window.

Window center - This setting causes the cursor to jump to the center of a newly opened window or dialogue box.

5.4.2 Rotation

Rotation sets the orientation for the direction of motion. This feature is useful if you intend to use the touchpad in a different position.

For example, if you prefer to use the touchpad upside down, you would click **Set Rotation**, turn the touchpad upside down and move your finger from the bottom of the touch surface to the top. This will set the direction of motion to match the way the touchpad is positioned.

The **Use Defaults** button is used to set the rotation back to the standard setting.

5.4.3 Motion extenders

Motion extenders help you drag efficiently and easily. Motion extenders only work with tap engaged drag functions.

No extend disables all Motion extenders.

GlideExtend, when enabled, virtually eliminates the edge of the pad when dragging. For example, if you drag an item and hit the edge of the touchpad's surface, GlideExtend will hold the drag while you lift and reposition your finger to complete the drag function. GlideExtend will time out after 3 seconds. GlideExtend can be released at the edge of the pad by tapping once or releasing the drag away from the edge of the pad.

Drag lock, when enabled, holds the drag function indefinitely until a primary button is pressed or until you tap on the pad.

Motion extenders can be found in the touchpad control panel on the **Options** tab.

5.5 General Tab

If the touchpad control panel is open, click on the **General** tab.

This group of options allows you to change pointing device drivers and the current pointing device (the device being adjusted by the control panel settings).

The **Name** field allows you to change the currently installed pointing device driver. Changing the driver from the **GlidePoint** driver will disable the touchpad control panel, returning the standard mouse control panel.

The **Choose a device to customize** setting allows you to select a pointing device from a list of currently connected devices that can be adjusted with the various options included in software.

Tapping on the Touchpad's touch surface will simulate button clicks.

Right-clicks - can be activated by tapping the upper right corner of the touch surface.

Left-clicks - can be activated in the remainder of the pad.

Drag features - can be activated by double-tapping and holding your finger on the pad.

Enable a scrolling method that is compatible with most Windows based applications.

Enables a scrolling method that is compatible with most 97 compatible applications that support advanced vertical scrolling. Office 97 type applications offer not only horizontal and vertical scroll options, but also a Zoom control that allows you to increase or decrease the current view in an Office 97 application.

To scroll vertically - lift and place finger on the right edge of the touchpad and glide your finger up or down.

To scroll horizontally - lift and place finger on the lower edge of the touchpad (excluding the corners) and glide your finger left or right.

To zoom in or out - lift and place finger on the left edge of the touchpad and glide your finger your finger up or down (applicable in many 97 applications).

To go back or forward pages - on the world wide web lift and place a finger on the upper edge of the touchpad and glide your finger left or

right. Each 1/8 inch movement will activate a page change. Note: the back/forward feature also may be used in some applications such as time management software for moving from day to day.

6 Printer

The ImageMaster VDS-CL utilizes a Fuji Thermal Imaging System to produce printouts of user selected images. A complete technical reference to the printer is contained in the accompanying Printer technical manual. This chapter is designed as a "quick-start" review of the printer's basic operating procedures.

6.1 Film types and film loading

Two types of film are available for the ImageMaster VDS-CL system. The high-grade Super VDS film is installed at the factory and the printer is set to process this thermally fixed film. The regular-grade film is UV fixed, so the **Film Select** setting must be adjusted if switching film types.

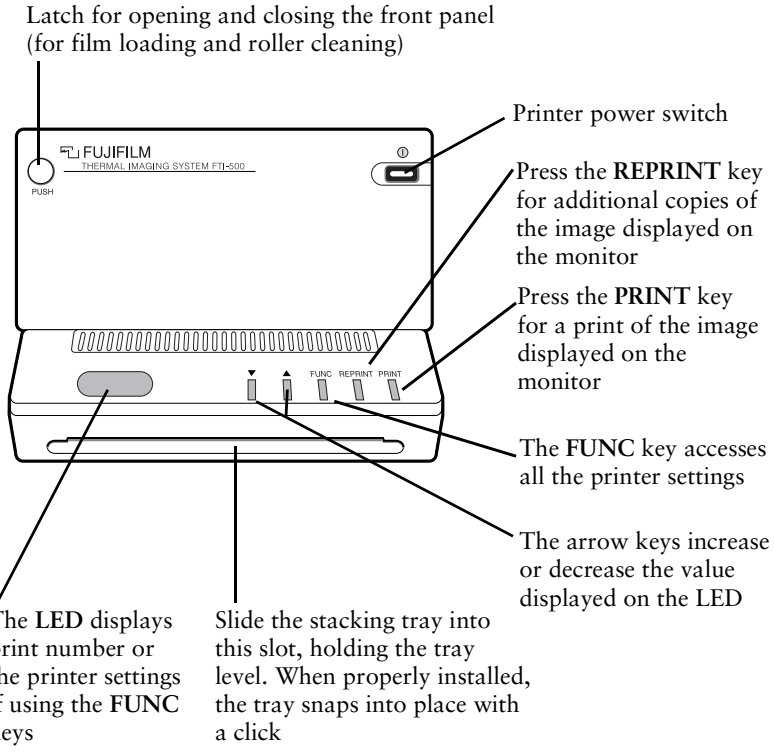
Latch for opening and closing the front panel (for film loading and roller cleaning)
Printer power switch
Press the REPRINT key for additional copies of the image displayed on the monitor
Press the PRINT key for a print of the image displayed on the monitor
The FUNC key accesses all the printer settings
The arrow keys increase or decrease the value displayed on the LED
The LED displays print number or the printer settings if using the FUNC keys
Slide the stacking tray into this slot, holding the tray level. When properly installed, the tray snaps into place with a click
FUJIFILM
THERMAL IMAGING SYSTEM FTI-500
PUSH
FUNC
REPRINT
PRINT

Fig 6-1. Layout and functions of the thermal-imaging printer.

6.1.1 Loading a roll of film

This section describes how to install a new roll of film when no film is currently installed, or when the film roll is empty. To switch to a different type of film, first remove the installed film by following the instructions in the next section "Removing a roll of film".

Note the type of film you are installing. Super VDS film is included with the unit, and the printer is originally set to **LCr** to process it. Regular VDS film can be ordered, and if used, the setting must be changed to **TFF** (see step 9 below).

Note: Keep film away from direct sunlight during loading. Always store film in a cool, dark place.

1 The VDS mains power switch must be on, the secondary power switch must be turned to ON, and the printer power switch must be on.

2 Release the printer cover by pressing the **PUSH** button on the upper left corner.

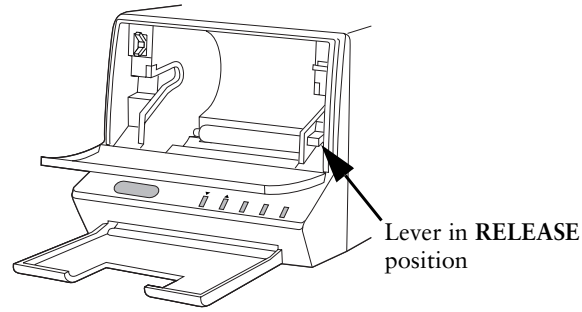

Fig 6-2. Removing an empty roll of film.

3 Move the thermal head release lever down to the **RELEASE** position.

4 Lift the film roll out of the holder rails. Remove the flanges from both ends of the spool and insert them into the new roll of film.

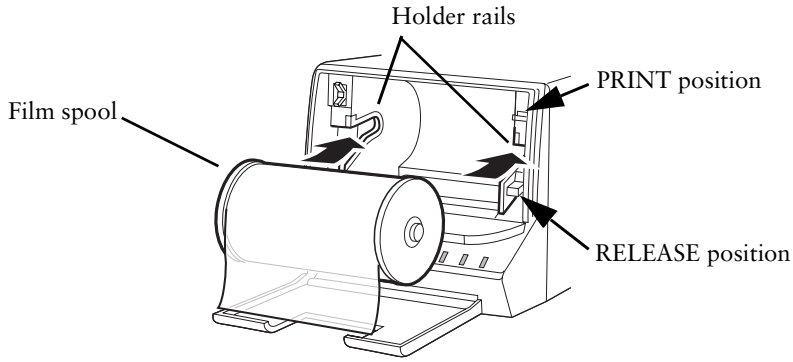

Fig 6-3. Loading a new roll of film.

5 Seat the new film spool into the holder rails. Once the spool seats, the rubber roller will start rotating. Guide the film to the back of the compartment and gently press the middle of the spool just until the film starts to self-feed.

6 Allow the film to feed until it emerges at the stacking tray and then stop the roller by lifting the thermal head release lever into the **PRINT** position.

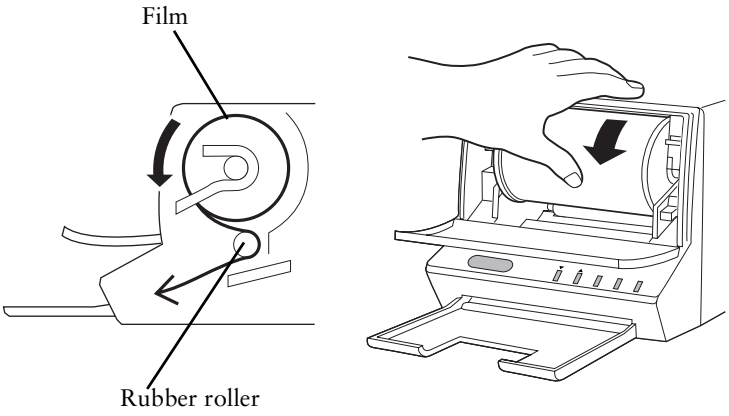

Fig 6-4. Feeding the film through the roller.

7 Close the front cover.

8 Optional step: Reset the counter to zero by simultaneously pressing the **up arrow** and **PRINT** keys.

Note: Each film roll will produce 170 images at the default 4:3 aspect ratio.

9 If you are switching to a different film type, change the two settings as follows:

6.1.2 Film select setting

When the printer is in normal or standby state (showing the print number), press the **down arrow** key and then also the **FUNC** key. This will switch to a sub-menu in which 6 parameters can be set.

Forward through the menu 5 steps by pressing the **FUNC** key until either **LCr** (required setting for the Super VDS film) or **TFF** (required setting for VDS film) appears. Press either the **down arrow** key or the **up arrow** key to toggle between the two choices. Press and hold the **FUNC** key for longer than 0.5 s to set the current value and then exit.

6.1.3 Tone setting

When the printer is in normal or standby state, press the **FUNC** key to enter the Print mode submenu.

Forward through the menu 3 steps by pressing the **FUNC** key until either **T3** (recommended setting for Super VDS film) or **T7** (recommended setting for VDS film) appears. Please note that the setting that results in the closest approximation of the image on the monitor may vary slightly from these values.

Press either the **down arrow** key or the **up arrow** key to scroll through the tone setting options until the desired setting appears. Press and hold the **FUNC** key for longer than 0.5 s to set the current value and then exit.

6.2 Removing a roll of film

Allow the printer to rewind the film - never pull the film out while the printer is ON, or while the lever is in the Print position.

1 Set the printer to service mode: The ImageMaster VDS mains power switch must be ON, the secondary power switch must be ON, and the printer power switch must be OFF. Simultaneously hold down both the **PRINT** and **FUNC** keys and turn the printer power switch ON. The LED will indicate “SEV”.

2 Release the printer cover by pressing the **PUSH** button on the upper left corner of the cover.

3 To rewind the film, press the **FUNC** key. If necessary, apply gentle pressure to the film drum to help feed the film at the proper rate. The LED will indicate "**PrU**" (Printer unwind). Once the film edge is free, release the **FUNC** key.

4 If loading a new roll of film: Go to step 3 of the "Loading a new roll of film" section above. If cleaning the printer roller, go to step 2 of the "Cleaning the rubber roller" section below. If cleaning the thermal head, go to step 2 of the "Cleaning the thermal head" section below.

6.3 Clearing a film jam

Allow the printer to rewind the film - never pull the film out while the printer is ON, or while the lever is in the **PRINT** position.

1 The VDS mains power switch must be on, the secondary power switch must be switched to ON, and the printer power switch must be ON. Release the printer cover by pressing the **PUSH** button on the upper left corner.

2 Inspect the spool for proper placement, the film path for obstructions, and the film for signs of bunching or buckling.

To remove a damaged section of film, lower the thermal head release lever into the **RELEASE** position and allow the roller to advance the film into the stacking tray. If the printer is unable to feed the film, try rewinding the film as follows:

Return the lever to the **PRINT** position and switch the printer power OFF.

Simultaneously hold down both the **PRINT** and **FUNC** keys and turn the printer power switch ON. The LED will indicate **SEV**.

Note: If a section of film is stuck in the exit, pressing the **down arrow** key in the **SEV** mode will trim it off.

To rewind the film, apply gentle pressure to the film drum (to help feed the film at the proper rate) and then press the **FUNC** key to start rewinding. The LED will indicate "**PrU**" (Printer unwind). Once the film is free, release the **FUNC** key. Move the thermal head release lever down to the **RELEASE** position. Reload the film according to instructions in the "Loading a roll of film" section above.

If the roller is still unable to fed the damaged film, turn the power to the printer OFF and lower the lever into the **RELEASE** position. Lift the roll of film out and slowly but firmly pull the film free of the roller. Once the film is free, cut off the damaged section (It may be easier to reload the film if you angle the cut slightly.). Turn the printer power back ON. Reload the film according to instructions in the "Loading a roll of film" section above.

Note: It is advisable to clean the roller (see below) after a jam to remove particles that may streak the film.

6.4 Cleaning the Printer

6.4.1 Thermal head

It is good practice to run the cleaning sheet after every roll of film to prevent printing quality problems such as blotches and streaks. The maximum recommended interval between cleaning sheet runs is three rolls of film (approximately 500 prints).

Important: Use only the accessory cleaning sheet to clean the thermal head.

1 Remove the film according to the instructions in the "Removing a roll of film "section above.

2 Lift the roll of film out. Turn the printer power OFF and then ON to reset the printer mode. The LED will indicate error condition 1 and an audible beep will sound.

3 Make sure the thermal head release lever is in the **PRINT** position.

4 Note the instructions on the cleaning sheet: Do not touch the cleaning section of the sheet, be sure to insert the sheet with the cleaning surface facing up (the printed side of the sheet will be against the rubber roller, and the matte side will contact the thermal head), and take care to align the sheet.

   The positioning line on the cleaning sheet should align along the entire length of the edge just above the rubber roller. The sheet must be fed evenly to ensure proper alignment. Also, make sure that the sheet makes contact with the rubber roller - gently edge the sheet down as far as it will go.

5 Simultaneously press the **FUNC** and **up arrow** keys. The cleaning sheet will advance but not pass all the way through. As the sheet advances, the LED will switch from indicating error 1 to indicating cleaning mode CL3.

If the cleaning sheet does not begin to feed, move the thermal head release lever to the **RELEASE** position and reposition it.

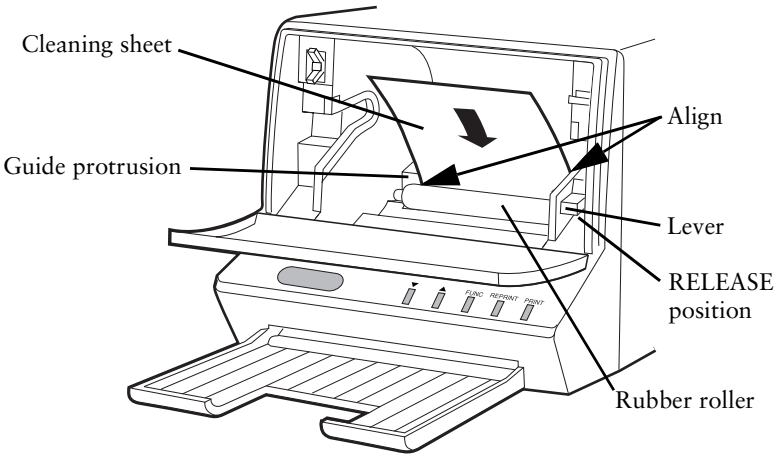

Fig 6-5. Cleaning the thermal head.

When the cleaning sheet begins to enter the stacking tray, an audible beep will sound and the LED will display cleaning mode CL2. Move the thermal head release lever to the **RELEASE** position. The printer will then eject the cleaning sheet and the LED will first display cleaning mode CL1 and then error 1 for about 30 seconds.

If the sheet becomes stuck because it engaged with the roller too late, turn the power to the printer OFF and lower the thermal head release lever into the **RELEASE** position. Slowly but firmly pull the sheet free. Go back to step 3 above.

6 Repeat steps 3 to 5 as often as required.

7 To reload the film, see the Loading a roll of film section above.

6.4.2 Rubber roller

White vertical lines or black spots on your prints may indicate that the rubber roller and/or the thermal head require cleaning. If cleaning doesn't improve the photo quality, contact a qualified service technician to replace the thermal head or roller.

1 Remove the film according to the instructions in the "Removing a roll of film" section above.

2 Turn the printer power OFF and then ON to reset the printer mode. The LED will indicate error condition 1 and an audible beep will sound,

3 Moisten a cotton swab with water to clean the roller - do not use gauze or cloth because they may catch in the roller.

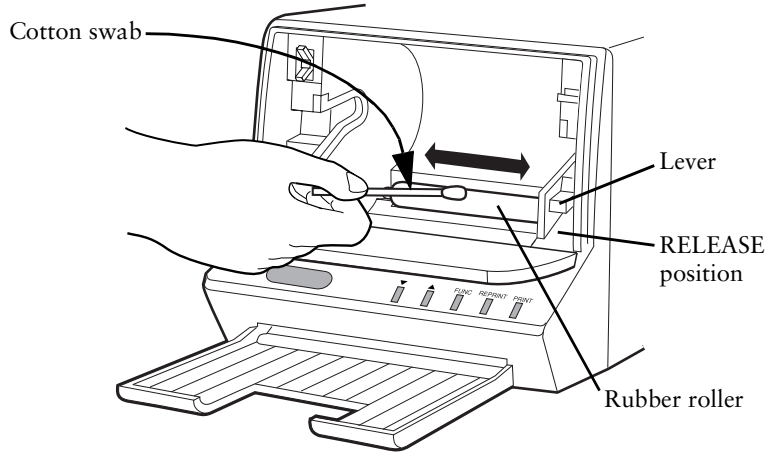

Fig 6-6. Cleaning the rubber roller.

4 Press the **REPRINT** key to start the rubber roller rotating. It will rotate for about 30 seconds. (The LED will first indicate error 1, and then cleaning mode CL1). Clean the roller with the cotton swab as it rotates.

5 Allow the roller to dry.

6 Move the thermal head release lever into the **RELEASE** position.

7 Reload the film as described in the "Loading a roll of film" section above.

6.5 Printer pre-sets

Printer parameters are preset for ImageMaster VDS-CL system applications. The factory set parameters for the system are listed below for your reference.

Menu available by pressing the **FUNC** key only (PRINT mode)

Brightness	b0*
Contrast	C0*
Tone	T3 (Super VDS film) or T7 (regular VDS film)
Gain select	G_n
Gain	G28

*The available range for these settings is -9 to 9. However, 0 is the default (and nominal) setting, and settings outside the -3 to 3 range are not recommended.

Menu available by pressing both the **FUNC** and the down arrow key simultaneously (FUNCTION mode 1)

Output	THr
Enhance	EoF
H-size	5_0
Format	F10
H-posi	H0C
V-posi	U0E

Menu available by pressing both the **FUNC** and the up arrow key simultaneously (FUNCTION mode 2)

Aspect	A43
Int/Noint	in
Odd/Even	odd
Mono/color	Cro
Signal select	S_A
Film select	LCr (Super VDS film) or TFF (Regular VDS film)

Menu available by pressing the **FUNC**, up arrow, and down arrow keys simultaneously (First set the LED display for S3 with the up arrow and down arrow keys and then press **FUNC** to access FUNCTION mode 3)

Direction	d 0
Posi/Nega	PoS
Film cutsize	C_n
Cutter	Con
Mirror	obu
Gradation	G_8

Menu available by pressing the **FUNC**, up arrow, and down arrow keys simultaneously (First set the LED display for S4 with the up arrow and down arrow keys, and then press **FUNC** to access FUNCTION mode 4)

LED display select	d50
Print no. print	Con
T/H temp print	ToF
EPDT	9A8
VSDT	5Cd
Filter select	5F1

Menu available by pressing the **FUNC**, up arrow, and down arrow keys simultaneously (First set the LED display for S5 with the up and down arrow keys, and then press **FUNC** to access FUNCTION mode 5)

ID print	Pon
ID character set	050

Note: The 16 available characters are programmed at the factory to spell "APBiotech". To re-program, see the Fuji Thermal Imager manual.

6.5.1 Restoring default printer parameters

If the printer settings are in an unknown state, restore default parameters according to the instructions below. For a full description of all printer options and settings, see the Fuji™ Thermal Imager instruction manual accompanying the ImageMaster VDS-CL system.

1 To initialize all printer parameters, hold down both the **down arrow** and **PRINT** keys while turning the printer mains power switch ON.

2 After printer initialization (step 1), each print will be labelled "Fuji film". To program the 16-character label to read "APBiotech", follow the procedure below. For additional codes to program your preferred text, refer to the Fuji printer manual.

a Press the **FUNC** key while holding down both the **up** and **down arrow** keys to access "FUNCTION mode 3". Then select "S5" (FUNCTION mode 5) by pressing the **up arrow** key twice.

b Press the **FUNC** key two times to access the ID character set. The position (0) and character (46) code for "F" in Fuji film will appear: 046.

c In this position, use the up and down keys to select the desired character code for the first (0) position. For A, the code should be 041, as shown in the table below. Press the **FUNC** key to accept. The next set of character codes automatically appears. The table below lists all position and character codes required to program an"APBiotech" label on each print.

Character	Position/Character code
A	0/41
P	1/50
B	2/42
i	3/69
o	4/67
t	5/74
e	6/65
c	7/63
h	8/68

d Press the **FUNC** key for more than 0.5 s to set the selected values

and exit.

3 Check that the film type setting matches the film type in the printer.

4 To match the print to the monitor image, follow the procedures (outlined below) for UV transillumination or for white light imaging.

6.5.2 UV transillumination procedure

1 Make sure you have chosen the UV sample tray, that the sample is in place, and that the tray is properly installed.

2 Adjust the desired picture size (using the **Zoom** function).

3 Adjust the focus (using the **Focus** controls or **Auto Focus**).

4 Print the image by pressing **PRINT** on the printer.

While printing, the printer displays "P" and does not accept further commands. Once the print number displays, the printer is ready to print.

6.5.3 White light imaging procedure

1 Make sure you have chosen the while sample tray, that the sample is in place, and that the tray is properly installed.

2 Adjust the desired picture size (using the **Zoom** function).

3 Adjust the Focus (using the **Focus** controls or **Auto Focus**)

4 Print the image by pressing **PRINT** on the printer. While printing, the printer displays "P" and does not accept further commands. Once the print number displays, the printer is ready to print.

7 Troubleshooting

This section provides advice on steps to be taken if you encounter problems with the operation of the ImageMaster system.

Symptom: The system will not turn on

1 Check that the main power switch is ON.
2 Check that the mains power inlet is properly connected.
3 Check the main fuse (an extra fuse is located in the fuse holder).

Symptom: The monitor does not function

1 Check that the monitor power switch is ON.
2 Check the power inlet to the monitor.

Symptom: The printer does not function

1 Check that the printer power switch is ON.

Symptom: One of the lower, upper, or cutting lamps does not function

1 Check that the lamp is properly seated in it's socket.

Symptom: The laser pointer does not function

1 Check that the drawer is in the Guide position - pull the drawer out to optimise the positioning.

Symptom: The Touchpad does not function

1 Check that the mouse driver is properly set up.

Symptom: The computer does not detect the PS2

1 Check the computer default setting.

Symptom: The system and monitor work, but there is no image on the monitor

1 Make sure the connector RGB from the monitor is connected.

2 Check that the monitor's green lamp is on.
3 Check the power cable to the monitor.

Symptom: The computer does not detect the keyboard

1 Check that the keyboard connector is properly connected.
2 Check the computer default setting for the keyboard.

Printer problems

Symptom: After pressing the PRINT key, no film emerges

1 Turn the printer power OFF. Check that the film is properly loaded.
2 If the printer is out of film, reload.

Symptom: Printout is spotty

1 Send a cleaning sheet through the printer to clean the thermal head.

Symptom: Printout quality is poor

1 Check the printer settings - there are two film types and the proper setting must be chosen.
2 Store the film in a cool, dry place to preserve film quality.

Symptom: Error message

1 Refer to the separate Fuji Thermal Imager instruction manual accompanying the ImageMaster VDS-CL system. It contains an error code key on page 16.
2 Reset the printer by turning the printer power switch OFF and then press the DOWN arrow + the PRINT button, then press ON.

8 System maintenance

8.1 Care and cleaning

Use a soft cloth dampened with water or a mild cleaning solution to clean the outside cabinet, display, and labels.

Wipe sample trays after each use to remove all residual materials. Use only a damp cloth and a mild cleaning solution. Do not mark sample the sample tray surface by cutting gel on it or scraping gel away.

See the printer section (Chapter 6) for instructions on cleaning the printer.

8.2 Replacing parts

8.2.1 UV Lamps

Whenever the lights are turned on, the ImageMaster VDS-CL system automatically checks that all UV lamps are working. To perform a check of the UV lamps:

1) Install a UV tray and switch the Lower illumination to ON.

2) Check the status bar window for an error message.

3) Repeat this procedure for the Upper illumination.

4) Replace any non-working lamp with an 8W, 312 nm standard UV lamp.

To replace a lamp:

IMPORTANT: Turn the system OFF and disconnect the power cord from the mains outlet.

Remove the sample tray and open the compartment door. Note that there are 8 lamps (4 UV and 4 white light) ordered as follows (from the inside out): WL, UV, WL, UV, WL, UV, UV, WL (see Fig 8-1).

Remove the malfunctioning lamp by carefully rotating it about 1/4 turn counterclockwise until the pins align vertically. Carefully pull the lamp upward.

To insert the new lamp, hold it so that the metal pins align vertically. Place the lamp in the sockets at each end of the unit and lightly push it into place. Rotate the tube about 1/4 turn clockwise until it locks into place.

Lamp codes:

First letter = Light type (W = White, U = UV, C = Cut)
Second letter = Lamp location (L = Lower, U = Upper)
Number = Lamp number

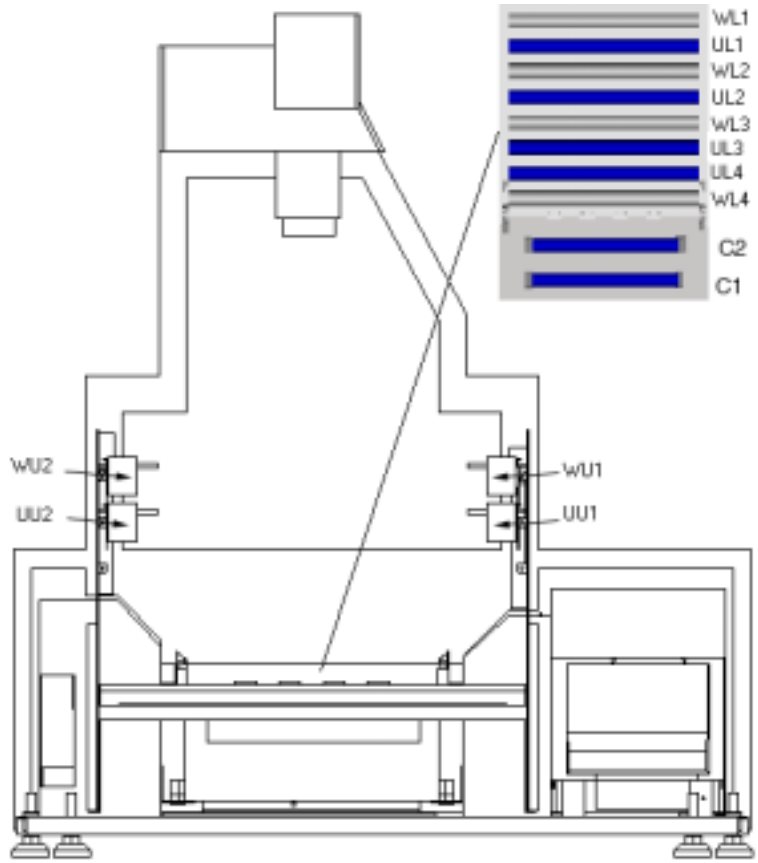

Fig 8-1. Layout of the lamp locations within the system.

8.2.2 White light lamps

1) Install a White light tray and switch the Lower illumination to ON.
2) Check the status bar window for an error message.
3) Repeat this procedure for the Upper illumination.

4) Replace any non-working lamp with an 8W white lamp.

To replace a lamp:

IMPORTANT: Turn the system OFF and disconnect the power cord from the mains outlet.

Remove the sample tray and open the compartment door. Note that there are 8 lamps (4 UV and 4 white light) ordered as follows (from the inside out): WL, UV, WL, UV, WL, UV, UV, WL.

Remove the malfunctioning lamp by carefully rotating it about 1/4 turn counterclockwise until the pins align vertically. Carefully pull the lamp upward.

To insert the new lamp, hold it so that the metal pins align vertically. Place the lamp in the sockets at each end of the unit and lightly push it into place. Rotate the tube about 1/4 turn clockwise until it locks into place.

8.2.3 Replacing fuses

Fuses do not require maintenance, but may fail due to fatigue under normal operating conditions. Fuses protect equipment by disconnecting loads too large for the instruments circuit design. For continued protection, replacement fuses must be of the specified voltage and current ratings (4A Slow Blow).

The fuse holder, situated above the main power cord, holds two fuses (one is a spare).

To replace the fuse:

1) **Caution**: Set the power switch to OFF and detach the power cord before replacing fuses.

2) Insert a small, flat-blade screwdriver into the slot on the fuse holder, depress, and pull the holder door forward.

3) Pull the fuse out of its holder and inspect it. If the fuse element is burned or broken, replace the fuse with an identical type. If the fuse appears to be intact, check it with an ohmmeter.

4) Insert a good fuse into the holder and press the holder door shut.

A System Specifications

The following table summarizes the specifications for the ImageMaster VDS-CL system. System specifications are subject to change without notice.

Instrument Type:	Thermo-electrically cooled CCD digital camera with micro lens technology
Built-in Computer:	Pentium MMX Processor, 233Mhz 32 Mb Ram 6.4 Gb Hard drive 48 bit I/O card SVGA card, 2Mb VRAM Ethernet Serial & Parallel ports
Interfacing:	Integrated, industry standard PC Pentium 233 with Ethernet 10/100 Mbits, floppy disk & hard drives, RS232 C and parallel output, keyboard and mouse.
Wavelengths:	6 filters, motorized turret.
Selectable emission filters:	“Green” - 99% @ 555 nm (high pass) “Blue” - 99% @ 495 nm (high pass) “Red” - 99% @ 595 nm (high pass) “UV low” - 520 nm (band pass) “UV high” - 580 nm (band pass)
Gel positioning:	By laser beam.
Gel cutting facility:	Yes, by additional UV tubes.
Sample Illumination (standard):	UV (312 nm) and “white light” (in reflection or transmission mode).
Spatial resolution at maximum magnification:	4 lp/nm
Temperature controlled CCD:	752 x 582 pixels
Lens:	Motorized for zoom, aperture and focus.

Focus:	Automatic in any mode.
Image file format:	TIFF 12, 10, or 8 bits.
Printout:	Built-in high quality video printer and parallel port.
Sample drawers:	Chemiluminescence, fluorescence and white light.
Sample drawer size:	21 x 25 cm
Voltage:	100 - 240 V
Frequency:	50 - 60 Hz
Power consumption:	300 W
Dimensions (HxWxD):	88x80x41
Operating temperature/ humidity:	+ 10 to + 30 °C/max. 80% Rh (according to IEC 1010-1)
Weight:	Approx. 50 kg
EMC and Safety:	CE 89/336/EEC (EMC directive) CE 73/23/EEC (LV directive) EN-50081-1, EN 61326-1 IEC/EN-61010-1

B System Accessories

The following table gives a list of the ImageMaster VDS-CL accessories and their code numbers.

Description	Quantity	Code Number
CL drawer	1	18-1137-93
UV drawer	1	18-1137-91
White light drawer	1	18-1137-92
VDS film (TFF)	4 rolls/14m	80-6249-67
Super VDS film (HG)	4 rolls/14m	80-6249-86
Tube white light 6 W (top)	2	18-1134-10
Tube UV 6 W 254 nm (top)	2	18-1134-04
Tube UV 6 W 312 nm (top)	2	18-1134-05
Tube UV 6 W 360 nm (top)	2	18-1134-11
Tube white 8 W (bottom)	2	18-1139-27
Tube UV 8 W 254 nm (bottom)	2	18-1134-03
Tube UV 8 W 312 nm (bottom)	2	18-1139-28
Tube UV 8 W 360 nm (bottom)	2	18-1134-15
Field calibrator	1	18-1137-90

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